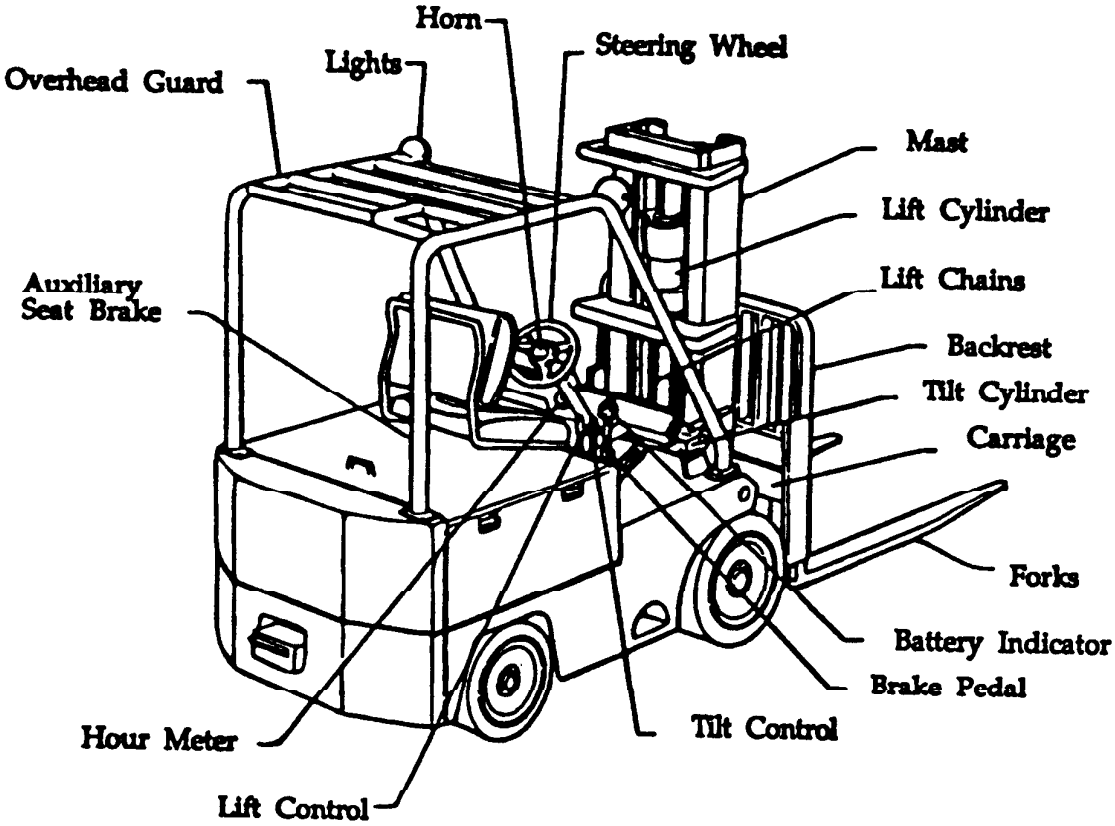
OUTLINE FOR TRAINING OF POWERED INDUSTRIAL TRUCK OPERATORS

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health
Division of Technical Services
Cincinnati, Ohio
October, 1978


Horn
Steering Wheel
Lights
Overhead Guard
Mast
Lift Cylinder
Lift Chains
Auxiliary
Seat Brake
Backrest
Tilt Cylinder
Carriage
Forks
Battery Indicator
Brake Pedal
Hour Meter
Tilt Control
Lift Control

ACKNOWLEDGMENTS

This guide was prepared under the direction of Gerald J. Karches, Chief, Technical Information Development Branch (TIDB), National Institute for Occupational Safety and Health (NIOSH), with the help of individuals from the NIOSH Regional offices. Information was obtained from industrial truck manufacturers and distributors, state and federal agencies, trade associations, insurance companies, NIOSH studies, and workers compensation data, and through site visits at various locations. P.A. Froehlich, Chief, Technical Publications Development Section, TIDB, had responsibility for preparation of the guide. Principal contributor to its development was Peter A. Doob, Industrial Hygienist, TIDB. Tom Davis, Writer-Editor, Information Support Services Section, edited the document.

DHEW (NIOSH) Publication No. 78-199

CONTENTS

INTRODUCTION

The Occupational Safety and Health Act of 1970 includes a provision that "only trained and authorized operators shall be permitted to operate a powered industrial truck." The law places the responsibility for operator training on the employer. Because there are many types of powered industrial trucks, and they are used in a great variety of circumstances, the regulations do not attempt to set out every element of an acceptable operator training program.

This pamphlet is intended to assist the employer in developing a training program adequate to protect operators and bystanders, and sufficient to satisfy the OSHA regulations.

Throughout the text, the word "truck" is used to refer only to a powered industrial truck. All other types of vehicles commonly called trucks are named more specifically (e.g., "highway truck"). The notations in the margin of the text indicate the relevant section from the OSHA regulations, 29 CFR 1910.178, wherever a specific section applies to all or part of an item.

QUESTIONS AND ANSWERS ABOUT OPERATOR TRAINING

Q: Why is training required?
A: Accidents involving powered industrial trucks are both numerous and severe. Training is intended to clarify the differences in handling between a truck and a car, to develop safe operating habits, to explain the consequences of taking certain kinds of chances, and to reduce the risk of injury to pedestrians as well as operators. (Pedestrians are involved in 1/3 to 1/2 of truck accidents resulting in injuries.)

Q: What if I don't own the trucks, such as those rented for special jobs?
A: The operator's employer is the person responsible for operator training. If your employee drives a truck, you must see to it that he or she is trained.

Q: Can I have others perform the training?
A: Yes. But make sure all the applicable training elements mentioned in this pamphlet are covered, and that the training includes any hazards that apply in particular to your workplace but which aren't mentioned here.

Q: How do I find out who runs operator training courses in my area?
A: Check the list in the back of this pamphlet. Note that most truck dealers can offer training or assistance in obtaining it. In some areas, vocational schools offer training courses.

Q: If I do the training myself, how do I know that my

program satisfies OSHA requirements?

A: Call or visit the Kentucky Labor Cabinet, Occupational Safety and Health Program, Division of Education and Training.

Q: What are the items that need to be covered in operator training?

A: Inspecting the truck prior to use, the function and proper use of truck controls, general truck loading practices, loading and unloading highway trucks and trailers, loading and unloading railroad cars, traveling speeds, cornering speeds, the importance of adequate clearance and of looking in the direction of travel, working in hazardous environments or with hazardous materials, precautions when leaving a truck unattended, refueling and recharging operations, procedure when truck defects are found, driving near pedestrians, how to determine if a load is safe to handle, modifying trucks, and the specific hazards of the trainee's prospective tasks in the plant.

Q: What if an item on the list above doesn't apply to our workplace (or example, no railroad cars handled)?

A: You need not include it in your training program.

Q. Does this list cover all items that are required?

A: No. Specific situations may require additional training if employees are to be adequately protected. No single publication of this length could include all workplace situations while still covering most of the basic areas. Effective training requires that operator trainees also be given instruction in any hazards specific to their tasks that aren't covered by the basic information.

Q: What medical tests should be made on prospective truck operators?

A: Field of vision, depth perception, visual acuity, color vision, hearing and screening for cardiovascular problems, motor defects, neurological disorders (e.g., any conditions that could cause sudden loss of balance, vision or consciousness without warning), and for any medication being taken which could affect perceptual or motor abilities. Drug and alcohol testing.

Q: Are all industrial materials-handling vehicles included in the OSHA industrial truck operator training requirement?

A: No. Equipment covered includes:
--fork trucks
--industrial tractors
--platform lift trucks
--motorized hand trucks
--other specialized industrial trucks powered by electric motors or internal combustion engines

Equipment NOT covered includes:
--farm vehicles
--earth-moving vehicles
--over-the-road hauling vehicles
--industrial trucks operated with compressed air
--industrial trucks operated with nonflammable compressed gases

Q: Must I train employees who only run powered industrial trucks occasionally?

A: Yes. All persons who operate trucks must be trained. Persons operating them only occasionally are as frequently injured as any other group of drivers.

Q: What if I hire operators with previous training, or with extensive experience?

A: You should at least test operating proficiency of these drivers. In addition, all drivers new to the plant should receive thorough instruction in the hazards of their prospective tasks, in the right-of-way rules of the plant, and in the way the truck maintenance system works. An operator with extensive experience on one brand or model of truck still needs time to get used to controls placed in different positions or to different attachments or truck types.

Q: If OSHA asks for evidence that I've trained an operator will I have to show certain types of training materials or that I've used professional trainers?

A: No. The OSHA training requirements gives you plenty of room to develop your own training scheme, as long as it works. Some firms, for example, rely almost exclusively on live one-to-one training and very little on written materials. (At least 10 hours of practice driving is recommended for the live portion of any training.) A log should be kept as evidence of operator training. In case of an inspection, OSHA compliance officers may check this information by questioning employees to verify that sufficient training has been given.

Q: Who can be an operator trainer?

A: There are no requirements, but the trainer obviously

must have sufficient knowledge and experience with the subject matter in order to teach effectively. If you are using your own employees as trainers, select your most experienced personnel. If a staff trainer is not available, the truck manufacturer or supplier can often provide assistance.

Q: Is the training requirement satisfied by a one-time course?

A: That depends on the particular situation. Some employers have a program of training, licensing, refresher training, and relicensing at regular intervals of two or three years. This is an excellent way to reinforce the learning process. In any case, employees with poor accident records or work practices should be required to take refresher courses. Also, when operators are assigned to trucks that are significantly different from the vehicles they are experienced on, they should be trained on the new trucks before assuming these new duties.

Q: Should training be performed on company time?

A: Yes. You want employees to practice thoroughly before they go out on the floor or in the yard with a truck. Trainees may reason that if training is not important enough to spend company time on, it's not important at all and they may not take it seriously.

Q: Is there any need for an observation period after training is completed?

A: Some authorities recommend a 1-2 week probationary period after training during which new operators are assigned easier tasks and are closely supervised. Whether this step is valuable in your situation will depend on the difficulty of the operators' regular tasks. (For instance, a new operator is probably the wrong choice for a two-truck heavy machinery transfer.)

Q: Are there particular policies management can establish to reduce truck accidents?

A: Certainly. As one of the expert reviewers of this publication put it: "Somewhere in here it should be emphasized that by teaching certain work rules and practices and safety principles during training, the employer is pledging to the trainees that they will be able to work safely by doing what they've been taught,

and won't get in trouble for it. This means, among other things, that the employer pledges to have the proper equipment available for the job, in adequate supply and repair, reasonably close to where it is likely to be needed. The employer pledges to refrain from instructing the trainees to engage in practices prohibited by their training, and to make sure drivers are aware they have the time and authority to do the task properly the first time. The employer pledges further that when a driver notes and reports a defect in a truck, the defect will be made good again promptly so that the driver will not have to lose any significant amount of time from his regular duties, or drive a defective truck. This in turn means that maintenance operations for powered industrial trucks must be adequately staffed, housed, equipped, and supplied. Employers must back up and practice what they preach in training and safety meetings."

TRAINING OUTLINE

I. Hands-On Experience

1. Over obstacle courses (for example, using empty cardboard cartons for the "load," allow trainees to turn, stop suddenly, turn sharply, drive over debris, holes, etc., drive up and down ramps, and so on to give them actual experience with falling loads.)

2. In plant (several levels of difficulty)

   a. narrow aisles
   b. intersections
   c. inclines
   d. loading and unloading
   e. stacking and unstacking
   f. confined spaces (if applicable)
   g. near pedestrians
   h. crash doors
   i. recharging or refueling
   j. inspecting the truck
   k. traveling in reverse when load obscures forward view
   l. crossing railroad tracks (if applicable)

II. Verbal Training

1. Differences Between Powered Industrial Trucks and Cars, and Between Sidewalk Pedestrians and Plant Pedestrians

   a. differences between driving a truck and a car:

      1. trucks move considerably slower, and most are smaller than cars--deceptively so, because of their greater weight makes up for this slower speed and smaller size in terms of the hazards they present

      2. because most trucks are not designed to use shock absorbers or springs, road shocks (from ruts, dips, debris, rough spots, etc.) can more readily spill the load; surface irregularities are a problem

everywhere--in the yard the larger, air-filled tires absorb some road shocks, but the ruts and dips are larger; in the plant, solid rubber tires are generally used and they can't compensate for the uneven surfaces encountered inside--when traveling over such surfaces is unavoidable, speed must be reduced considerably.

3. visibility is often poor for the truck operator when traveling forward with a bulky load

4. a truck must be operated more smoothly than a car in order to maintain adequate stability; a truck is more easily tipped over than a car because of the location of the load, the truck's higher center of gravity, and the truck's narrower track width (distance between wheels on an axle)

5. both ends of a counterbalanced truck (load and counterweight) swing during a turn due to rear wheel steering--drive wheels must be in front (load bearing) for such trucks to get adequate traction with a small tire; maneuverability in tight quarters is enhanced by rear steering; extra room must be allowed when turning to clear stationary objects, other moving trucks, and pedestrians

6. truck steers more easily with a load (but not an overload), due to lower weight on steering (rear) wheels, while a car steers easiest unloaded.

7. trucks, especially battery-electric models, can be considerably quieter than a car; pedestrians and other truck operators may not hear you approaching, especially in noisy areas

8. overloading a counterbalanced truck can cause loss of steering (rear wheels lose traction necessary for steering)

9. all cars are equipped with headlights; on trucks, operating lights are often options--changes in plant lighting or

storage arrangements may require that nonlighted trucks be equipped with lights or that lighted trucks be used to ensure adequate light levels for safe operation

10. one way that cars and trucks do not differ: turns must be slow in order to make a sharp turn, especially when the vehicle is loaded, because the higher the turning speed and load weight, the more the steering wheels creep (increasing the turning radius)

b. differences between plant and sidewalk pedestrians:

1. pedestrian on sidewalk has special walkway free from motorized traffic; plant and yard pedestrians share the "road"--both operator and pedestrian must respect the difference and take precautions (discussed in section 6, "Traveling: In Traffic")

2. over-the-road vehicles rarely carry loads that are unsecured or overwide and that could strike a pedestrian by their size or instability; trucks may do so frequently

3. the auto operator can often see pedestrians entering the roadway, and sidewalk pedestrians often have traffic signals to protect them; in many plants, blind intersections are common and signals uncommon

4. the truck and the load often occupy most of the width of a narrow aisle; streets that narrow with no sidewalks are relatively rare

5. pedestrians in the plant aisles do not always take the precautions they would in the street--they may not be watching for truck traffic

6. one way that plant and sidewalk

pedestrians do not differ: neither stands a chance in a collision with a 3,000 pound car, a 10,000 pound lift truck, or a 6,000 pound load

2. Truck Operating Controls and Safety Devices

a. manufacturers' operating guides: provide a copy of manufacturers' operating instructions to each trainee at the beginning of training and review it in class

b. operation of controls: explain what each control does and demonstrate how to work it

c. malfunctions: explain how to recognize malfunctions and defects (and what may result if they are uncorrected)

d. load capacity: explain load capacity information

3. Attachments

a. description of attachments: identify attachments used in the plant or yard and their specialized functions

b. use of attachments: instruct each operator in the proper use of each attachment that the work requires

c. load capacity: explain which attachments alter the rated load capacity and how much; explain how to adjust driving and loading practices accordingly

4. Inspections

(q)(7) a. when inspection is required: trucks must be inspected prior to use on each shift

(p)(1) (q)(1) b. inspection items: withdraw from use and tag the truck if any safety defects are found; explain how to check:

1. tires (for cuts, gouges, imbedded objects; air pressure, if pneumatic)
2. steering

3. foot or other service brake; parking brake
4. hydraulic system
5. controls
6. horn
7. chains and limit switches
8. mast, carriage, and attachment (for damaged, loose, or missing bolts; unusual wear or chain guides or insides of mast channels)
9. condition of slides for adjusting fork width--when properly lubricated, forks slide smoothly; latches secure and in good condition

(a)(6) 10. nameplate and markings (load limits, etc.)

if applicable, also inspect:

11. operating lights; flashing or rotating lights
12. clutch or creeper control
13. overhead guard; load backrest extension
14. battery connectors

(p)(4) 15. fuel line (for leaks or damage)

(q)(8) 16. exhaust system (for sparks, flame, or leaks)

(q)(8) 17. water muffler water level
18. directional signals
19. backup alarm
20. seat-actuated dead man brake
21. coolant level
22. engine oil level
23. seat belt or lap bar
24. catalytic converter
25. shift linkage

(p)(5) c. inspecting fluid levels: use of open flame, such as a match or lighter, to check gasoline or battery electrolyte levels is prohibited--both gasoline vapors and hydrogen gas (produced during recharging) explode violently

5. Picking Up the Load

a. starting the truck: when starting trucks (other than battery-electric), first put the controls in neutral--parking brake

should be set

(o)(1) b. unstable loads: no unstable or unsafely arranged

(m)(9) loads

1. discard broken pallets
2. restack, band, tape, or shrink-wrap any unstable load (explain proper manual lifting procedure for restacking)
3. use proper attachment (don't improvise)
4. bystanders may be injured by unstable loads falling off the truck
5. overhead protection is not designed to be effective against the falling of a capacity load

in addition, if forks are used:

6. use fork extensions if load is particularly deep (but be careful with extensions so that you don't topple the pallet behind the one you want--get out and examine the situation yourself)
7. lift from the broadest side of the load, and set the forks at the greatest width the pallet allows, for maximum stability
8. level the top of the forks
9. don't lift a load with only one fork

(o)(2) c. rated load capacity: no loads heavier than the rated capacity

1. truck capacity is marked on capacity plate
2. excess counterweighting (such as by persons standing or sitting on counterweight) is prohibited--reduce the load or get a larger capacity truck
3. load backrest extension or fork extension will increase the size of the load which can be handled, but will not increase the maximum weight which can be handled
4. counterbalanced trucks may tip with overweight loads
5. danger of losing part or all of steering control due to inadequate weight on steer axle, if load

is overweight
6. sidewalk doors and wood floors or platforms may be weakened or may collapse with overloads

(e)(2) d. load backrest extension: requirement of a vertical load backrest extension for high loads

1. to provide overhead protection for operators
2. to help prevent parts of load from falling on other persons

e. loading heavy equipment:

1. use of wedges to get equipment raised enough off broken skids to get forks under
2. use of a spotter to help in placing heavy equipment on skids
3. controls must not be run from floor if truck isn't made for that type of operation

(o)(1) f. off-center loads: caution required in handling off-center loads that can't be centered

1. strap load to mast with chain or nylon sling if load could be unstable during travel
2. take curves and corners much slower than when handling balanced loads
3. raise, lower, and tilt smoothly

(o)(5) g. center of gravity: need for keeping center of gravity of load as close to mast as possible

1. stability of loaded truck is increased as center of gravity of load is brought closer to the front axle
2. steering is easier when load is as close to the mast as possible
3. center of gravity may be safety shifted by tilting mast gently backward (but not excessively, particularly when the load is elevated)
4. if these precautions are not taken,

truck may tip forward or load may spill when braking, driving over a rough spot or turning

h. personal protective equipment:

1. safety shoes
2. hearing protection, if necessary
3. impervious gloves and boots, if containers of hazardous chemicals are handled (including empty containers, if not decontaminated)
4. respiratory protection, if necessary
5. eye protection (explain possible distortion of vision by goggles or blind spots with side shields, especially when backing)
6. head protection
7. full body coveralls, if necessary

(m)(2) i. persons passing under lift: operator must not pass forks or attachment over anyone, nor may anyone pass under them

1. this applies whether truck is loaded or empty
2. danger of striking someone with a fork or attachment
3. part of load may fall off and hit someone
4. danger of lowering load onto someone
5. exception: when unloaded lift section is adequately blocked for repair and truck is secure (wheels blocked)

6. Traveling

<u>general</u>

(n)(1) a. traffic regulations: know and observe plant traffic regulations (e.g., right-of-way rules and rules for when to sound the horn)

(n)(1) b. following distance: maintain a safe following distance (three truck lengths or three seconds recommended)

(n)(1) c. keeping the truck under control: the truck must be under control at all times (such that it can be

(n)(8) stopped safely); on slippery floors and floors with

(n)(10) dips or uneven surfaces, it may be necessary to travel considerably slower than when under ideal conditions

(n)(14) d. loose materials and slippery areas: avoid running over loose materials and slippery areas--this can cause back pain for driver, cause loss of control of the truck, cause driver to be struck by the steering wheel or lever, cause the load to spill, or dump the truck on its side

e. oil slicks: report or correct oil slicks, especially on docks and dockboards--don't drive through them

(n)(2) f. emergency vehicles: driver is required to yield right-of-way to emergency vehicles

(n)(12) g. dockboard or bridge plates must be secured before crossing with truck; travel over them must be careful and slow

(m)(8) h. overhead clearance: adequate overhead clearance must be maintained (e.g., from lights, sprinklers, heaters, pipes, overhead tracks, doorways)

i. hazardous stacks: report or correct dangerously leaning stacks (that could collapse spontaneously or when bumped)

(n)(15) j. steering: steering wheel must not be turned jerkily or too fast, in order to prevent loss of control, including tipping (swing of long loads such as bar stock, pipe, or lumber reduces stability, requiring especially slow and smooth

turns); wheel spinner knobs should not be used (can get caught on clothing)

(m)(3) k. riders: no riders except operator (rider can be pinned against materials or structures when rear end swings during steering, can fall if truck stops abruptly,

can distract driver, or can get hands caught in lift mechanism)

(n)(9) l. stunt driving and horseplay is prohibited (danger especially to pedestrians)

(m)(6) m. traveling near edges: safe distance must be maintained from edges--no unnecessary traveling close to edge of elevated ramps, platforms, or docks, or edges of flatbed highway trucks or freight cars; be careful of the truck rear swinging over the edge

n. no eating or drinking while driving

(n)(7), o. hand truck braking: purpose and function of dead

(i) man braking on motorized hand trucks; what to do when the brakes don't work

p. operator position rules:

1. may not leave truck unless controls are in neutral and parking brake is set (and wheels are chocked, if on a slope)
2. no operating truck if not in proper operating position (e.g., not from floor, except motorized hand trucks)
3. may not put hands, arms, legs, or head outside running lines (dimensions) of the truck or between mast uprights.

<u>at intersections, doors, elevators, and confined areas</u>

(n)(3) a. passing at hazardous locations: operator may not pass vehicles moving in the same direction at intersections, blind spots, or other dangerous locations

(n)(4) b. entering intersections where vision is obstructed: at intersections and other locations where vision is obstructed, operator must slow down and sound horn; use fixed convex mirrors provided in many such locations (identify these "blind spots" in your workplace) to check for cross-traffic

(n)(4) c. entering crash doors: slow down and honk

horn before going through, especially where windows are small; go through backwards (many pedestrians are injured by trucks coming unexpectedly through crash doors)

(n)(12) d. trucks entering elevators:

1. approach slowly
2. rated elevator capacity must be sufficient for combined weight of truck and load
3. after entering, shut off power, set brakes and put controls in neutral

e. entering confined spaces:

1. find out if respiratory protection is required in a hazardous area; if it is, what specific equipment is required

(n)(13)

2. keep an escape route open (drive truck in or wheel motorized hand truck in so that you are between load and exit--when entering, look first, then sound horn and proceed slowly so that you don't block someone else's escape route
3. make sure mast clearance is at least two inches
4. note danger of carbon monoxide (CO) poisoning when trucks other than battery-electric are used without pollution controls in poorly ventilated areas (note that properly designed pollution controls that are not operating properly can give a false sense

of security); CO is colorless, odorless and tasteless--early overexposure symptoms include headache, nausea and fatigue

5. typical confined spaces: barge, ship hold, freight car, semi-trailer mention examples of confined spaces in operator's work area

with a load

(n)(4) a. load obstructing forward view: operator must travel with load trailing when load obstructs forward view

1. always look in the direction of travel
2. drive slower (controls are harder to operate in reverse)
3. traveling blind is a hazard to by-standers, as well as operators
4. traveling blind increases the likeli-hood of hitting doorways, pipes, heaters, other trucks, etc.
5. whichever side driver turns to, there is a blind spot behind the back--the driver should turn and check this spot frequently

b. direction operator faces: must look in the direction of travel (whether load forward or trailing)

(n)(7), c. tilting load backwards: regardless of road

(iii) grade, load shall be tilted back where appropriate, and during transit shall be raised only as high as is necessary for adequate road clearance (traveling with raised load reduces the stability of the truck)

(o)(6) d. tilting loads forward: caution required when tilting elevated loads forward, and prohibition on such, except when picking up or depositing an elevated load

on a grade

a. operating on grades: use special care when operating on grades--travel slowly and do not angle or turn

(n)(7), (i) b. loaded rider trucks: loaded rider trucks operated on an incline greater than 10% must be driven with the load upgrade

(n)(7), (ii) c. empty rider trucks: empty trucks operated on grades should be run with the lift section downgrade

d. motorized hand trucks: operators of motorized hand trucks should keep the truck downgrade, whether loaded or empty (note that operator should stand to one side of control arm when operating a motorized hand truck in reverse; except on grades, hand truck operator should never travel in reverse unless maneuvering)

in the yard

a. yard hazards:

1. slowly moving trains (still take a relatively long distance to stop)
2. backing semi-trailers (have a blind spot)
3. temporary blind corners (e.g., from freight cars)

(n)(5) b. parking near tracks: no parking within eight feet of railroad tracks

in traffic

a. warning pedestrians and drivers: pedestrians and drivers of other vehicles in the area must know you are there and what you intend to do before you drive close to them or past them

b. keeping the forks low: with or without a load, keep the forks or attachment low (just high enough to clear rough spots, door sills, etc.)--a load held high is more likely to spill when traveling or turning, and pedestrians may be struck by the forks

c. manipulating the load: do not raise, lower, or tilt the load while traveling--the load can easily fall on someone

d. operating near pedestrians:

1. 3 mph speed limit near pedestrians
2. panic stop distances for typical loaded truck:
   1 mph - 1.3 feet
   10 mph - 22 feet
   18 mph - 55 feet
3. avoid congested areas or areas where pedestrian traffic is heavy

(m)(2) 4. don't pass load or lifting apparatus over heads of pedestrians, or allow them to pass under elevated load

5. don't expect pedestrians to warn you--watch rear swing yourself; ask people to move out of aisles and off ramps or wait for them to clear the area
6. keep pedestrians back when tiering or unstacking

(m)(1) 7. don't approach pedestrians with a rider truck or motorized hand truck if doing so could trap the person between the truck and a fixed object (e.g., wall or bench)

7. Setting the Load Down

a. while traveling: don't lower (or raise) the load while traveling

b. working in close racks: spotter or fork-height positioner or other compensating method may be required when working with high-reach forklift in close racks

c. fall zone: keep assistants and other pedestrians out of the area where load could fall

(m)(14) d. emergency exits and equipment: never place a load in an aisle, or block a stairway, fire equipment, or a fire aisle

e. overhead clearance: caution necessary to avoid hitting heaters, electric cables, steam pipes, chainfalls, sprinkler heads, and conveyors with elevated load

(o)(6) f. tilting load forward: don't tilt the load forward until you have it on the floor or on top of the stack

g. while backing out: don't back out of a load while lowering the forks or attachments--back out carefully, stop, then lower the lift section

8. Loading and Unloading Boxcars and Highway Trucks

(k)(2) a. preventing rail car movement: wheel stops or other positive movement-preventing device must be used when working in railroad cars

(k)(i) b. preventing highway truck movement: highway truck must have brakes set and chocks must be used on both sides to ensure against highway truck movement; otherwise, highway truck can roll away from edge of dock, allowing lift truck to drop or tip

(k)(3) c. fixed jacks: use fixed jacks to prevent uncoupled semi-trailer from upending when truck enters (especially important when unloading last sections of cargo from far end of trailer)

(j) d. dockboards and bridge plates: dockboard or bridge plates must be used to provide smooth, gapless riding surface between highway truck and dock, and must be properly secured

(m)(1), (m)(7) e. defects in carrier floors: check highway truck, trailer, or rail car floor for breaks, weaknesses, or slippery spots before driving on it--a weak floor may collapse (the weight of even an unloaded truck is substantial)

(m)(6) (modified) f. opening or moving rail cars: don't use a truck to move a rail car or to open and

close rail car doors; truck attachments specifically designed for opening or closing rail car doors can be used if hazards are not created: attachment must be of competent design, operator must not be endangered if a door should fall, attachment must be operated so that force is applied parallel to door, pedestrians must be out of the area, operator's view of door must be unobstructed and operator must be specifically trained to perform this task

9. Leaving the Truck

(m)(5), (ii) a. definition of unattended truck: truck is "unattended" if operator is not in view of it, or is in view of it but is more than 25 feet away

(m)(5), (i) b. when truck is unattended: when truck is unattended attachment must be fully lowered, controls put in neutral, power shut off, brakes set, and (if on slope) wheel chocks in place

(m)(5), (iii) c. when operator leaves controls: when truck is attended but operator leaves the controls, the lifting member must be fully lowered, the controls put in neutral, and the brake set (in this situation, it is not required that power be shut off and wheels chocked)

d. approved parking areas: truck may only be parked in approved location--for example, LP truck must never be parked near a furnace or other significant source of heat (gas will expand and trigger the relief valve); no truck my be parked blocking an aisle or exit

10. Refueling and Recharging

a. general practices:

1. truck should be unloaded, forks or attachment lowered to floor, and parking brake set before refueling or

recharging

(p)(2) 2. engine must always be shut off when refueling; driver should leave vehicle

b. gasoline and diesel trucks:

(p)(5) 1. safe methods for checking level of gasoline in fuel tank

(f) 2. requirements for storage and handling of fuels; use of fuel containers

(p)(3) 3. gasoline or diesel trucks may not be restarted after refueling until all spilled fuel has evaporated, or has been wiped up or washed off, and fuel tank cap has been put in place

c. LPG trucks:

1. don't refuel or store LPG tanks near sources of heat, or near underground entrances, elevator shafts, or other depressions where leaking gas could accumulate
2. check tank to see that there are no sharp dents or gouges that could weaken the structure
3. don't throw, drag, drop, or roll LPG containers
4. check fuel lines for rubbing, chafing, or exposure to manifold heat
5. check for damage to liquid level gauge
6. inspect quick-disconnect coupling for damage, deterioration, and for damaged or missing flexible seals
7. make sure threads are in good condition
8. check the valves and fittings for damage
9. check to see that the relief valve points in the direction specified by the manufacturer
10. make sure hand wheels, relief valves, and valve caps are in place
11. make sure locating pin is intact and that it properly engages the tank
12. don't jam the valve in the open position (when opening valve, open fully, then turn toward closed position 1/4 to 1/2 turn--this prevents jamming and enables quick shutoff in an emergency)
13. wear gloves when changing LPG tanks,

as escaping gas is painfully cold to the skin

14. after installing a new cylinder, check fittings for leaks with a soap solution (never with a match or other flame, or with the bare hand
15. if LPG tank is kept on a truck overnight or longer, close the service valve

d. electric trucks:

(g)(4) 1. mechanical lifting aid plus battery lifting sling is required for battery handling
2. charging area must have working emergency eyewash fountain--explain where it is and how to use it (how to hold eyelids open, need for 15-minute flush)
(g)(1) 3. battery charging limited to designated areas
(g)(2) 4. ventilation must be adequate to disperse hydrogen produced by batteries during charging
(p)(5) 5. open flames may not be used to check levels of electrolyte in batteries
(g)(7) 6. always add battery acid to water (not the reverse), except when adding water to replace water lost during charging
(g)(6) 7. bulk electrolyte must be handled by use of a carboy tilter or siphon; the siphon must never be started by sucking
(g)(10) 8. no smoking in the charging area (note: charging area must be posted with "No Smoking" signs)
(g)(11) 9. eliminate sparks, electric arcs, and open flames in battery charging areas
(g)(12) 10. keep metal tools and items away from top of uncovered batteries to prevent arcing
(g)(8) 11. brake must be applied when charging or changing batteries
(g)(9) 12. vent caps must be inspected to ensure that they are not plugged and must be placed in position before battery is charged to avoid electrolyte spray
(g)(9) 13. battery cover or compartment cover must be left open during charging to

dissipate heat

14. only pull battery connector in an emergency, or when recharging (otherwise, wear on the terminals causes arcing)
15. wear impervious gauntlet gloves and eye or face protection when filling battery cells

(g)(5) 16. properly position and secure batteries reinstalled in trucks; to prevent shifting of an undersized battery, excess space in battery tray should be filled with a wood or similar spacer (dummy)--note that use of an undersized battery reduces the load capacity of the truck where the battery is part of the counterweighting

11. Restricted Uses of Trucks

(m)(12) a. special requirements when truck is used for lifting an employee:

1. some trucks are designed to lift an employee (stock pickers, order pickers, sideloaders)--these provide controls on the elevated platform, and are required to have a shutoff switch on the platform so that elevated employee can cut power (e.g., if control contacts become fused "on")

2. for trucks <u>not</u> designed for lifting employees:

a. elevated platform must measure at l least two feet by two feet and must be securely attached to the lifting member (employee can't simply ride the fork or pallet up)
b. second employee should stay at stationary controls while person is elevated
c. the driver and the person lifted should maintain eye and voice contact--the driver should never manipulate any of the truck's controls until the lifted person is made aware of what is to happen and is prepared for it

d. a standard guardrail on exposed sides of the platform, or a safety belt or harness (with lanyard that limits free fall to four feet) should be used

3. rules for all trucks used to lift employees:

a. where head injuries could result from falling objects, heat protection is required for the platform rider
b. never travel with a person elevated except to make minor movements to position the platform or with high-lift order picker trucks; keep the parking brake on at all other times
c. mast should not be tilted when an employee is elevated
d. never tamper with the limit switches on the mast that cut down on top speed in proportion to platform height
e. warning flasher or rotating light should be activated on fixed portion of truck when employee is elevated

b. other restricted uses:

1. forks may not be used to push, poke, or compress materials
2. forks may not be used to open jammed freight car doors (use a small chain winch), or to move rail cars
3. truck may be used as a tractor only if attachment points provided for this purpose are used
4. truck may not be used to open and close freight car doors unless attachment designed for this purpose is used--for other conditions, see Section 8(f) above

12. Maintenance and Repair

(p)(1) a. removing truck from service and authorized repairs: a truck found to have any defects (that could make the unit unsafe to operate) must be immediately taken out of

service until repairs are completed; repairs must be made only by personnel authorized by the employer

(q)(9) b. overheated parts: a truck with any overheated part shall be removed from service until repairs are completed

(q)(8) c. clogged muffler: a truck with a muffler containing internal parts, such as screens, must be withdrawn from use if such parts become clogged, until the clogging is corrected

(a)(4) d. modifications: no modifications are allowed which would reduce truck safety, such as by increasing load capacity beyond the design capacity

(q)(12) e. fuel conversion: only approved conversion equipment may be used when converting gasoline-operated trucks to run on LP gas

(q)(6) f. excess counterweighting: counterweighting in excess of design counterweight limit is not permitted

(q)(2), (q)(3) g. fire hazards: repairs which may involve fire hazards (e.g., on fuel and electrical systems) must be performed in designated areas, and never in areas where such work could create a fire hazard (Class I, II, and III locations--see "Hazardous Materials and Areas")

(q)(10) h. solvent use:

1. no low flash point solvents ("flammable" class liquids, such as gasoline or acetone) may be used
2. adequate ventilation is required when cleaning with organic solvents (outdoor use preferred)
3. extreme health hazard potential of breathing vapors of benzene, carbon disulfide, gasoline, chloroform, trichloroethylene, perchloroethylene, or carbon tetrachloride
4. respiratory protection is required

if concentration of solvent vapors in air is not lowered enough by ventilation (maximum level depends on length of exposure during an 8-hour day)

5. combustible solvents must be dispensed into safety cans if transporting of small quantities of solvent is required
6. don't start solvent siphon by sucking on hose (results of swallowing organic solvents are very serious)
7. thorough and immediate eyewash is required when solvent splashes in eyes (discuss location of emergency eyewash station and how to use it)
8. let hot parts of trucks cool before using solvents

13. Hazardous Materials and Areas (include as appropriate)

a. identification: know what material you're handling

b. label warnings: read label of chemical container to determine shock sensitivity, flammability, emergency spill or lead procedures, etc.

c. protective clothing: wear specified protective clothing when handling hazardous chemicals (e.g. impervious gauntlet gloves)

d. respiratory protection: use appropriate respirator where air is oxygen-deficient or contaminated (give examples of such areas, if any, in the plant and describe monitoring devices; note: anyone using a respirator must be given respirator training--NIOSH will soon publish a respiratory protection guide)

e. spills and leaks: spills and leaks of hazardous materials must be isolated, such as by roping off contaminated areas; supervisor should be notified of leaking or otherwise damaged containers

f. solvents: fire, breathing, and eye contact hazards of organic solvents, and long-term breathing hazards of chlorinated solvents

(especially chloroform, carbon tetrachloride, trichloroethylene, and perchloroethylene) and certain unchlorinated organic solvents (e.g. gasoline, benzene, and carbon disulfide)

g. other chemicals: skin and eye contact hazards of many pesticides, acids, caustics, and certain other industrial chemicals; how to use and where to find emergency eyewash fountains and showers, what gloves and eye protection to wear, how to inspect gloves for leaks, dangers of wearing contact lenses (both hard and soft type) due to capillary action drawing splashed liquid into eye

(i) h. noxious exhaust gases: hazards of noxious gases produced by trucks powered by diesel fuel, LP gas, or gasoline (oxides of nitrogen and hydrocarbon pollutants, as well as carbon monoxide)

(h) i. lighting: adequate lighting is required--either fixed sources or fixed plus truck-mounted sources

(m)(11) j. "approved" trucks: only an "approved" truck can be used in locations where fire hazards exist ("approval" is based only on fire considerations)

(b) k. truck classifications: fire protection purposes of the eleven designations of industrial trucks and tractors (they indicate one or more of the following tests have been made: muffler, exhaust system, backfire, spark emission, fuel pump explosion, or electrical switches)

(c) l. work area classifications: which particular areas of your workplace, if any, are classified because of their fire hazards as Class I (gases and vapors), Class II (dusts), or Class III (fibers or flyings) locations for purposes of truck selection

m. unsafe tasks: employee should be instructed to refuse to do any of the following (and then notify supervisor):

    1. transport leaking or otherwise defective containers
    2. use a truck is not trained to use it
    3. work with an unsafe truck
    4. handle an unsafe load
    5. work faster than safety allows

n. protected activities: employee should be advised that Federal law prohibits retaliation against a worker who engages in a health or safety activity, such as complaining of unsafe conditions, practices, or equipment to the employer, OSHA, or to a union

INFORMATION SOURCES

Training Programs

Live training programs and materials are provided by many truck manufacturers, dealers, and local vocational schools. For capsule descriptions of films, slides, tapes, and printed programs available from truck manufacturers, see Modern Materials Handling, Oct. 1975, pp. 61-62.

National Safety Council:
Forklift Operators Training Course
44 North Michigan Avenue
Chicago, Illinois 60611

E.I. DuPont de Nemours & Co.:
Powered Lift Trucks--Operator Training
Industrial Training Service
Room 7450
Nemours Building
Wilmington, Delaware 19898

International Material Management Society:
A Training Program for Operators of Industrial Power Trucks
2510 Mosside Boulevard
Monroeville, Pennsylvania 15146

General Information

"Summary Analysis of Powered Industrial Truck Accidents"
John S. McPeek
State of Wisconsin
Dept. of Industry, Labor, and Human Relations
Box 7946
Madison, Wisconsin 53707

"Human Factors Analysis of Materials Handling Equipment"
P. Coleman, et al.
NIOSH (in press)

Safety Standard for Powered Industrial Trucks,
ANSI B56.1-1975
American National Standards Institute
1430 Broadway
New York, New York 10018

Flammable and Combustible Liquid Code, Standard #30
Liquefied Petroleum Gases, Standard #58
National Electrical Code, Standard #70
Type Designations, Areas of Use, Maintenance and Operation of Powered Industrial Trucks, Standard #505
National Fire Protection Association
470 Atlantic Avenue
Boston, Massachusetts 02210

Powered Industrial Lift Trucks, data sheet #653 (1977)
Powered Hand Trucks, data sheet #317/revision A, paragraph 3 (1975)
Liquefied Petroleum Gases for Industrial Trucks, data sheet #479/revision A-extensive (1969)
National Safety Council
444 North Michigan Avenue
Chicago, Illinois 60611

Electric Battery-Powered Industrial Trucks, #583 (1972)
Internal Combustion Engine-Powered Industrial Trucks, #558 (1972)
Underwriters Laboratories, Inc.
207 East Ohio Street
Chicago, Illinois 60611

NOTE: Inclusion in this list does not constitute endorsement by NIOSH OR OSHA